Comment on "Taleyarkhan *et al.* Reply:"

In their Reply [1] to my previous Comment [2], Taleyarkhan and coauthors measure their detectors' responses to a ^{252}Cf source, concluding that the resulting spectra differ substantially from the cavitation-fusion spectra published earlier in their Letter [3]. On the contrary, I conclude that the two data sets are qualitatively consistent.

NE-213 neutron spectra. To compare proton-recoil spectra, their scales must first be calibrated, typically to equivalent electron energy via γ calibration sources. Though the authors provided ^{137}Cs and ^{60}Co γ calibrations in their Letter (see Fig. 1(a) of my previous Comment), in their Reply, they do not provide a γ calibration along with their ^{252}Cf spectrum. Nevertheless, their detector's response to ^{252}Cf, and the corresponding ^{137}Cs and ^{60}Co γ calibrations, are given in Figs. 5(b) and 4 of Ref. [4]. Comparison of the calibrated and the uncalibrated ^{252}Cf spectra shows that the detector's gain was approximately 10% less in the Reply than in the Letter. Using this calibration for the Reply spectrum, Fig. 1 shows the Reply's ^{252}Cf spectrum to be consistent with the Letter's cavitation-fusion spectrum.

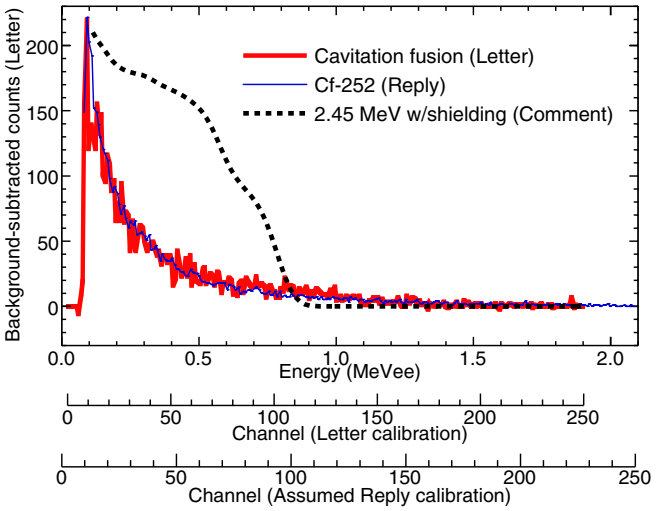

FIG. 1: (color online). The aggregate background-subtracted cavitation-fusion proton-recoil spectrum (Fig. 12 of the Letter's supplement [5]) compared with the ^{252}Cf spectrum from the Reply. Note that the "PRL" spectrum from Fig. 1(a) of the Reply is the same as the cavitation-fusion spectrum here, though data below channel 10 were removed from the Reply. As discussed in the text, the Reply spectrum is cross-calibrated to have a gain of 10% less than the Letter spectrum. For qualitative comparison, the simulated DD-fusion response from my previous Comment, with arbitrary vertical normalization, is also shown. See Refs. [6, 7] for examples of experimental DD-fusion proton-recoil spectra.

NaI(Tl) gamma spectra. In Fig. 1(b) of the Reply, the authors compare their "cavitation on" γ spectrum against an experimental ^{252}Cf γ spectrum. As shown in Fig. 15(a) of the Letter's supplement [5] (reproduced here in Fig. 2), the "cavitation on" spectrum is within approximately 2% of the "cavitation off" background spectrum. Consequently, they are comparing the ^{252}Cf spectrum against the natural γ background, not the cavitation fusion γ signal. For example, the peak at channel 14, also present in their undeuterated control runs, is due to ^{40}K's 1.46 MeV γ, the predominant feature of the terrestrial γ background [8]. These features do not appear in the Reply spectrum because their relatively intense ^{252}Cf source, placed only 30 cm from the detector, overwhelms the natural γ background.

The appropriate comparison would be between the ^{252}Cf γ spectrum and the background-subtracted cavitation-fusion γ signal. In this case, however, the subtracted signal is a small fraction of the background, and the error on a channel's count difference would be of greater magnitude than the difference itself. For example, in channel 14, there were approximately 970 'on' counts and 940 'off' counts, yielding a difference of 30 ± 40. Such a comparison would therefore be unfortunately inadequate to distinguish between ^{252}Cf and DD-fusion.

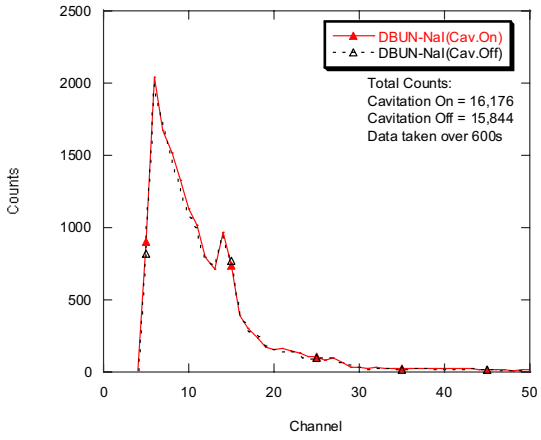

FIG. 2: Fig. 15(a) of the Letter's supplement [5].

In conclusion, Taleyarkhan and coauthors' cavitation-fusion spectra are consistent with their own ^{252}Cf spectra.

I thank S. Putterman for valuable discussions. This work is supported by DARPA.

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February 1, 2007
PACS numbers: 78.60.Mq, 25.45.-z, 28.20.-v, 28.52.-s

[1] R. P. Taleyarkhan, R. C. Block, R. T. Lahey, Jr., R. I. Nigmatulin, and Y. Xu, Phys. Rev. Lett. **97**, 149404 (2006).
[2] B. Naranjo, Phys. Rev. Lett. **97**, 149403 (2006).
[3] R. P. Taleyarkhan, C. D. West, R. T. Lahey, Jr., R. I. Nigmatulin, R. C. Block, and Y. Xu, Phys. Rev. Lett. **96**, 034301 (2006).
[4] Y. Xu and A. Butt, Nucl. Eng. Des. **235**, 1317 (2005).
[5] R. P. Taleyarkhan *et al.*, EPAPS Document No. E-PRLTAO-96-019605.
[6] J. Zmeskal *et al.*, Phys. Rev. A **42**, 1165 (1990).
[7] N. Nägele *et al.*, Nucl. Phys. A **493**, 397 (1989).
[8] R. D. Petrasso, X. Chen, K. W. Wenzel, R. R. Parker, C. K. Li, and C. Fiore, Nature **339**, 183 (1989).